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ABSTRACT

The purpose of the study was to compare electronic and traditional versions of a graduate-level introductory research class. Students were permitted to select the instructional delivery type they wanted, with the traditional option offered by one instructor and the electronic option offered by a second instructor. There were 71 participants in the electronic classes and 32 in the traditional classes, with a majority membership of white females enrolled in graduate education programs. Multiple choice pretests and posttests were administered to all groups. Results suggested that there was no statistically significant difference between the performance of the two groups. This suggests that the electronic option allows for comparable learning outside of the classroom. Included at the end of this document are the analysis of covariance report and course syllabus. (Contains 30 references.) (AEF)

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ED 438 778

Research: Traditional vs. Electronic Classes

Robert L. Kennedy

(rlkennedy@ualr.edu)

W. Newton Suter

Department of Educational Leadership

University of Arkansas, Little Rock

2801 S. University, Little Rock AR 72204-1099

Mid-South Educational Research Association

Annual Meeting

Marriott Grand Hotel

Point Clear, Alabama

November 17, 1999

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Abstract

The purpose of the study was to compare electronic and traditional versions of a graduate-level research class. There were 71 participants in the electronic classes and 32 in the traditional classes, with a majority membership of white females enrolled in graduate education programs. Multiple choice pretests and posttests were administered to all groups. An analysis of covariance indicated that there was no statistically significant difference, at the 0.05 level [$F(1,100)=2.29$, $p=0.13$] with a small effect size of 0.16, between the adjusted means of the two groups, suggesting that the electronic option allows for comparable learning outside of the classroom.

Research: Traditional vs. Electronic Classes

Only a few years ago, this researcher needed to look carefully to locate studies documenting teaching using electronic means. Today, the number of articles available has proliferated to the extent that they must be pared down for review. Some of the articles talk about teaching through e-mail or Web connections, in general terms (Dorman, 1998; Litvin, 1998; Making, 1998; Nordquist, 1997; O'Donnell, 1998; Phoha, 1999; Pritchard, 1998; Walker, 1999) while others discuss teaching specific subjects through the Internet (Anderson, 1997; Finch and Hand, 1998; Fredericks, 1999; Hedges and Mania-Farnell, 1998/1999; Hilton and Kameda, 1999; McDonnell and Achterberg, 1997; Pence, 1999; and Snyder, 1999). Still others talk about the technical aspects of wiring schools for e-mail (Rodberg, 1999), connecting students with experts via e-mail (Milone, Jr., 1997), creating virtual high schools (Hammonds, 1998), connecting student teachers (Everhart, 1997), and connecting students worldwide (Lelong and Fearnley-Sander, 1999; Lindroth, 1998.)

The use of electronic mail in education has become commonplace. Guernsey (1997) reported that electronic mail was in use in a third of college courses as recently as two years ago. No doubt that figure has increased since 1997. It seems reasonable at this point to consider, specifically, the use of technology for teaching a research course. Although Zagorsky (1997) identified at least one case where some students preferred to not use e-mail for a course, the reality is that teaching using this medium is not just here, but is growing like topsy. While there certainly have been articles published about teaching research (Denham, 1997; Grierson, 1999, Jago and Gardner, 1999; and Vialle, Hall, and Booth, 1997), the number dedicated toward teaching research by electronic means remains small. It is the purpose of this study, then, to compare electronic mail and more traditional "chalk and talk" approaches for teaching graduate introductory research classes.

The electronic course was first offered in the Spring of 1995 with the Spring, 1998, semester being the most recently included. The students were allowed to select the delivery type they wanted. The traditional option was offered by one instructor and the electronic option was available from a second instructor. There were 71 participants in the electronic classes and 32 in the traditional classes, with a majority of students being white females enrolled in graduate education programs. The students who preferred the e-mail approach fell into two groups, those who were generally somewhat knowledgeable about the use of computers and modems; and those who were seeking a way to avoid having to travel to class, regardless of computing capability. In either case, they were helped with any

difficulties they experienced in communicating this way. E-mail passwords were provided free, as part of student fees, by the academic computing center for students who did not already have their own accounts or who preferred to use a student account. Multiple-choice pretests and posttests were given, developed from standardized test preparation manuals to insure variance in the test scores as well as to insure that neither class was given an advantage in the types of questions asked.

The students who elected to follow the traditional approach were still expected to actively participate in the learning process. The class involved regular lectures about the content. In the e-mail version, the students discussed the content asynchronously, but on-line, leaving their comments for the teacher and the entire class to read.

To determine whether the students were performing at least comparably with students taking the course in the more traditional fashion, pretests and posttests were given, similar in format to the regular tests administered to both groups as part of their course grades. An analysis of covariance (ANCOVA) was run using posttest scores as the response variable and pretest scores as the covariate. Since the ANCOVA technique involves features of both the analysis of variance and regression, assumptions for both were tested using the NCSS statistical program, version 6.0.21. The assumption of random selection is not practical for most courses, but the two groups were demographically comparable. Normality and homoscedasticity across all groups were verified using the Omnibus Normality of Residuals and Modified-Levene Equal-Variance tests. Homogeneity of regression was observed in scatterplots of pretest scores versus posttest scores and their trend lines, by treatment and control groups. Therefore, the assumptions required for ANCOVA seemed to be reasonably well met.

The test indicated that the null hypothesis of no statistically significant difference between the traditional (adjusted mean of 12.85, n=32) and electronic (adjusted mean of 11.77, n=71) classes' scores could not be rejected at the 0.05 level [$F(1,100)=2.29$, $p=0.13$]. The effect size of the difference in the adjusted means is $f = 0.16$, described by Cohen (1988) as a small effect. It is concluded, then, that offering the course through electronic mail did not appear to hinder the performance of the students, to the extent measured by the multiple-choice tests, suggesting that the electronic course offering provided a flexible alternative for learning. Students noted the possibility of some nonacademic advantages over the traditional approach, commenting on "flexibility", "quick responses", "personal quality", "self-paced, self-directed" learning, need for more courses by electronic

mail, time savings by not having to commute, and interaction with classmates, among others. The responses from the students indicated that they believed that the experience was worthwhile. Overall, then, the electronic course offering seemed to provide a flexible alternative for learning, and the comparable posttest performances suggest that the e-mail approach allows an equivalent level of learning outside the classroom.

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Analysis of Covariance Report

Page	1
Database	C:\WPDOCS\CONFS\MSERA\MSERA99\MSER99B2.S0
Time/Date	10:22:52 06-15-1999
Response	Posttest

Expected Mean Squares Section

Source Term	DF	Term Fixed?	Denominator Term	Expected Mean Square
A (Elec/Trad)	1	No	S(A)	S+sA
S(A)	100	No		S

Note: Expected Mean Squares are for the balanced cell-frequency case.

Analysis of Variance Table

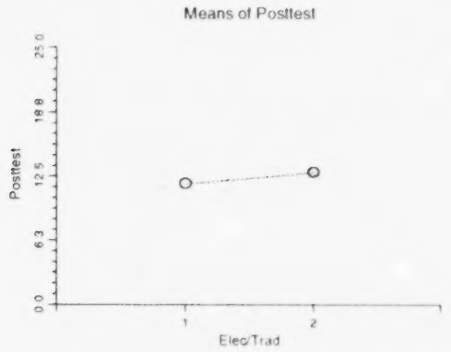
Source Term	DF	Sum of Squares	Mean Square	F-Ratio	Prob Level	Power (Alpha=0.05)
X(Pretest)	1	302.4022	302.4022	27.14	0.000001*	0.999248
A (Elec/Trad)	1	25.56114	25.56114	2.29	0.133035	
S	100	1114.295	11.14295			
Total (Adjusted)	102	1467.825				
Total	103					

* Term significant at alpha = 0.05

Means and Standard Error Section

Term	Count	Mean	Standard Error
All	103	12.31202	
A: Elec/Trad			
1	71	11.77002	0.3961603
2	32	12.85402	0.5900994

Plots Section



UNIVERSITY OF ARKANSAS AT LITTLE ROCK
College of Education
Department of Educational Leadership
(revised 1/15/98)

I.	Course Prefix and Number	EDFN 7303, Section 01
II.	Course Title	Introduction to Research and its Applications
III.	Credit	3 hours
IV.	Semester and Year	Spring, 1998
V.	Instructor	Rob Kennedy, Ph.D., Associate Professor of Educational Foundations
VI.	Office Location	Larson 204B
VII.	Office Hours	By appointment
VIII.	Telephone	xxx-xxxx (UALR), xxx-xxxx (home), rlkennedy@ualr.edu (mail) rlkenned@agora.ualr.edu (e-mail)

IX. Course Description

Application of scientific method to educational research including nature of research problems in education, theory of research, experimental design, techniques in data gathering, and the interpretation of results. Research reporting and bibliographical techniques.

X. Course Objectives

Use and adapt findings from scientific research to applied settings

Comprehend and evaluate written reports of research in education and related areas of inquiry

Prepare technical reports of research, including rationale, methods, findings, and interpretation of results

Acquire and analyze information through reviewing research literature

Evaluate and employ a variety of measurement techniques in the context of conducting research

Demonstrate knowledge of professional literature

Additional course objectives:

Become familiar with the fundamentals of the research process through such procedures as identifying research questions, planning research projects, writing grant proposals, conducting research, and writing research papers.

Become familiar with the fundamentals of being consumers of research through such procedures as locating research materials; reading them for knowledge, understanding, application, analysis, and synthesis; and evaluating them on the basis of their development, execution, and delivery.

Develop skills through research efforts which will help in continuing learning on a lifelong, independent basis.

Develop leadership and research skills through learning independently and making decisions based on this research.

XI. Texts, Readings, and Instructional Resources

Required Text

Suter, W. N. (1998). Primer of educational research. Boston: Allyn and Bacon.

Supplemental Reading

American Psychological Association. (1994). Publication manual of the American Psychological Association (4th ed.). Washington, D.C.: Author. (See also Annotated Bibliography)

XII. Assignments, Evaluation Procedures, and Grading Policy

Course Requirements

Students who demonstrate a commitment to the course through attendance, participation, reading, studying, and otherwise applying themselves to the course will benefit in direct proportion to that effort. In other words, "You get out of it what you put into it."

All students are expected to write a grant proposal to a funding agency. All students are also expected to review and critique papers, as well as to write and submit a one-paragraph bibliographic annotation of a research or grant text or article on a computer disk or through e-mail.

The funding agency for your proposal will be a source of your choosing. You will be expected to locate the funding source, request and obtain a grant application form from it, and complete it for submission to your instructor. A copy of the application form and its instructions must accompany the copy submitted to the instructor to enable accurate assessment. You are encouraged to submit the application to the funding agency, although this is not required. However, you should not pursue this option unless you have the time, resources, and commitment to administer the grant since a number of grants have been awarded to students in previous classes (see the section entitled "Some Funding Agencies to Consider") and you may become one of them! The funder will expect you to carry out the project and provide it with a final report. If you do follow through, please notify the instructor when you submit the document as well as provide documentation of the outcome.

Consider also the research and grant-writing articles and texts listed in the annotated bibliography to help learn terms and concepts for better critiquing of papers and for preparation for the final.

Evaluation Techniques/Concepts Used for Grading

Your work will be judged as to its acceptability by the instructor as determined by its quality and completeness. Work judged unacceptable may be corrected by the student and resubmitted if time permits. In other words, if you wait until the last class to submit your proposal, then I will

only be able to grade your effort as it stands at that time. You will not have a subsequent opportunity to improve it, during this class.

Grant Proposal (25%)
Participation (15%)
Final examination (50%)
Bibliographic annotation (5%)
Attendance and completion of in-class exercises May 7 (5%)

Grant Proposal (25%)

You are expected to complete a grant application from the funder of your choice.

In evaluating this grant proposal, I will be looking for the required (by the funding agency) components, as well as for the overall quality of the proposal in terms of its professionalism. Proper grammar, spelling, and punctuation, typing or word processing, and other aesthetic considerations are expected to be a part of your effort. The proposal should not only look good, but should read well. Proposals which do not meet these standards of professionalism will be considered unacceptable. You will need to submit your proposal on paper, but please do not use covers or other binders. Simply paper clip the pages together to facilitate their being taken apart for review. At least one other person, preferably more, should review your proposal before it is submitted for evaluation, to check for readability and completeness. If the paper is satisfactory, you will receive full credit. If it is not, then I will tell you what you need to do to complete or improve it, again, if there is time to do so.

Participation (15%)

Because the class is conducted almost entirely through electronic mail, it is your responsibility to maintain daily (or close to it) communication throughout the course by participating in class discussions and reading your e-mail. If you do not check your e-mail regularly then you may miss important class information. Also, if you do not read regularly, you will quickly find yourself innundated with e-mail from class members. Some guilty parties have complained about having 50 or 100 messages backlogged because they did not keep up with regular communication.

You will have one week (unless otherwise specified) to answer the questions from the "Critical Evaluation of the Paper" instrument. So that the entire class may benefit, you will need to post these responses to EDFN730301@ualr.edu where they may be read by all of the class members. It is expected that each class member will critique each other's responses and comment accordingly, referring to a minimum of one other student's responses, per paper. The comments must be constructive in nature although you may have a differing opinion. Merely being critical, though, will earn no credit. The goal is to help each other learn, since the knowledge of the entire class can be incorporated, rather than just that of the instructor. If your critique is satisfactory then you will receive full credit (5 percentage points). If the critique is not satisfactory, then I will let you know what you need to do to complete or improve it. I do expect the critiques to continually improve.

To discourage late submissions, which tend to confuse the rest of the class when it has moved on to the next paper, I will deduct 1 percentage point out of the 5 each critique is worth, for each day the work is late. If more than 5 days late, the critique will no longer receive credit. Please keep up!

Final Examination (50%)

The final exam is comprehensive, so regular studying of the text will be to your advantage. The questions and answers are included in the text, in the Multiple Choice Questions at the end of each chapter. The questions may require merely knowledge, the ability to apply information, or possibly synthesize or evaluate. The test is to help encourage you to learn the vocabulary and become familiar with the concepts of research so that you can do a credible job in the other aspects of this class as well as prepare you to be a beginning researcher. In addition, the test will likely cover more fully areas that are not as well addressed through the other activities. In that sense, it should be complementary to those activities.

I expect you to study the material in the text and then test yourself by answering the Multiple Choice Questions. If you do well, then you are making good progress. If you do not do well, then study more and continue the process until you feel satisfied that you are learning. Eventually you will know all of the answers because of your preparation. Your ability to respond to class discussions should also be an indicator. I am trying to provide you with a "safe" opportunity to learn and receive

credit for your effort, so do not memorize the answers. It will be a waste of your time since they will be forgotten quickly after the exam.

Note that the answers to the questions given in the text will be the only ones that will receive credit on the final. Saying that you do not understand questions and do not agree with answers will simply be strong documentation that you did not study as you should have.

Bibliographic Annotation (5%)

The specifications for the Bibliographic Annotation are described later, in the section entitled "Bibliographic Annotation". Both a computer disk copy and hard copy, or electronic mail copy of your annotation are required. Satisfactory work will receive full credit. I will tell you what needs to be done to complete any unsatisfactory work, time permitting.

Attendance and completion of in-class exercises May 7 (5%)

There are a few follow-up evaluative exercises which you will need to be available for at the end of the course. It is very important that you contribute to the course in this way. These functions are important enough for evaluation and research purposes to assign them 5% of the credit to be awarded in the class. Please plan to participate.

Grading Scale

90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

In a Nutshell Summary

I. Grant proposal (25%)
   - A. Think of a topic.
     1. Consider your interests.
     2. Consider sample topics.
   - B. Follow model for a proposal.
     1. See "Funding Agencies to Consider".
     2. Ask school or agency officials for calls for proposals.

C. Read in research book about elements of the proposal model or application form.
D. Last day to submit work is May 7, 1998.

II. Participation (15%)
A. Stay in regular communication.
1. Check your mail.
2. Critique papers.
B. Send your critiques to EDFN730301@ualr.edu.
C. Discuss responses electronically with classmates.
D. Attend class on May 7, 1998.

III. Final examination (50%)
A. Study material in text.
B. Quiz yourself using the Multiple Choice Questions.
C. Final exam is on May 7, 1998.

IV. Bibliographic annotation (5%)
A. See examples in annotated bibliography.
1. Consider the research articles and texts to help learn terms and concepts for better critiquing of papers and for preparation for the final.
2. Consider the grant-writing articles and texts to help with your grant-writing
B. Use American Psychological Association (APA) style.
C. Last day to submit work is May 7, 1998.

V. Attendance and completion of in-class exercises May 7 (5%)
A. Posttest
B. Class evaluation form
C. Departmental evaluation formD.Final exam

XIII. Class Policies

Assignments are sometimes rewritten more than once before being accepted, in which case acceptance is determined from the latest revision, not the original. If acceptance is not reached, then a lower grade will be awarded. Early submissions are strongly encouraged.

XIV. Class Schedule

January 15	a.	Introduction, activities, pretesting
	b.	Assignment: Topic selection and read the WhatToDo file
January 22 (Optional)	a.	Ottenheimer Library visit, activities, pretesting
	b.	Assignment: Topic selection, read course outline
January 22-January 28	a.	First group critiques "Note-Taking Fosters Generative Learning Strategies in Novices" (pp. 25-31).
	b.	Work on assigned activities/projects.
January 29-February 4	a.	Second group critiques "Providing Study Notes: Comparison of Three Types of Notes for Review" (pp. 45-53).
	b.	Work on assigned activities/projects.
February 5-February 11	a.	Third group critiques "The Action Research Endeavors of Six Classroom Teachers and Their Perceptions of Action Research" (pp. 53-63).
	b.	Work on assigned activities/projects.
February 12-February 18	a.	Fourth group critiques "Self-Esteem, Need for Approval, and Cheating Behavior in Children" (pp. 76-82).
	b.	Work on assigned activities/projects.
February 19-February 25	a.	First group critiques "Continued High or Reduced Interparental Conflict Following Divorce: Relation to Young Adolescent Adjustment" (pp. 100-108).
	b.	Work on assigned activities/projects.
February 26-March 4	a.	Second group critiques "Does the 'Art of Teaching" Have a Future?" (pp. 108-116).
	b.	Work on assigned activities/projects.
March 5-March 11	a.	Third group critiques "Sociometric Differences BetweenMildly Handicapped and Nonhandicapped Black and White Students" (pp. 135-143).
	b.	Work on assigned activities/projects.

March 12- March 18	a.	Fourth group critiques "Cultural Literacy: A Concurrent Validation" (pp. 163-170).
	b.	Work on assigned activities/projects.
March 19- March 25	a.	First group critiques "Modified Reciprocal Teaching in a Regular Classroom" (pp. 183-191).
	b.	Work on assigned activities/projects.
March 26- April 8	a.	Second group critiques "Interspeed Postpassage Questions and Reading Comprehension Achievement" (pp. 210-215).
	b.	Work on assigned activities/projects.
April 9- April 15	a.	Third group critiques "Is Susceptability to Distraction Related to Mental Ability?" (pp. 230-237).
	b.	Work on assigned activities/projects.
April 16- April 22	a.	Fourth group critiques "Importance of Classroom Climate for At-Risk Learners" (pp. 237-255).
	b.	Work on assigned activities/projects.
April 23- April 29	a.	? group critiques "Effects of Cuing on Middle-School Students' Performance on Arithmetic Word Problems Containing Extraneous Information" (pp. 274-280).
	b.	Work on assigned activities/projects.
May 7 (Thur.)	a.	ALL STUDENTS NEED TO ATTEND. Final exam day
	b.	ALL WORK MUST BE COMPLETED AND SUBMITTED BY THIS DATE.

Receiving E-mail or a File in Larson Mac lab

1. Turn on computer.
2. Double-click mouse on station icon.
3. Double-click mouse on Vax Terminal (Kermit).
4. Press return (enter).
5. LH111A> C Athena
6. UserName: [Your Name]
7. Password: [Your Password]
8. $ Mail
9. Mail> Read
10. [Read your mail.]
11. Mail> Exit
12. $ LO [to Log Out]
13. Local -011- Session 1 disconnected.
14. LH111A> LO (NO return)
15. Local -20- Logged out port 31 on server LH111a
16. Close window in upper left corner
17. Click on File, hold, and pull down to Quit
18. Close station window
19. Click on Special, hold, and pull down to Shut Down

Sending E-mail in Larson Mac lab

1. Turn on computer.
2. Double-click mouse on station icon.
3. Double-click mouse on Vax Terminal (Kermit).
4. Press return (enter).
5. LH111A> C Athena
6. UserName: [Your Name]
7. Password: [Your Password]
8. $ Mail
9. Mail> Send
10. To: rlkennedy@ualr.edu
11. Subj: [Purpose of message]
12. Enter your message below. Press CTRL/Z when complete, or CTRL/C to quit:
13. [Enter your message.]
14. CTRL/Z
15. Mail> Exit
16. $ LO [to Log Out]
17. Local -011- Session 1 disconnected.
18. LH111A> LO (NO return)
19. Local -20- Logged out port 31 on server LH111a
20. Close window in upper left corner
21. Click on File, hold, and pull down to Quit
22. Close station window
23. Click on Special, hold, and pull down to Shut Down
24. Close window in upper left corner
25. Click on File, hold, and pull down
26. Close station window
27. Click on Special, hold, and pull down to Shut Down

Sending a File (Larson Mac Lab)

1. Turn on computer.
2. Double-click mouse on station icon.
3. Double-click mouse on Vax Terminal (Kermit).
4. Press return (enter).
5. LH111A> C Athena
6. UserName: [Your Name]
7. Password: [Your Password]
8. $ Mail
9. $ Kermit
10. C-Kermit Receive
11. Return to your local Kermit and give a SEND command.
    KERMIT READY TO RECEIVE. . .
12. Click on File-Transfer at top of screen
13. Pull down with mouse to send file.
14. Select desktop.
15. Insert disk with file on it to send.
16. Highlight file to send.
17. Click on Select to select that file.
18. You will hear 2 beeps when complete.
19. C-Kermit> Exit
20. $ Dir (To look for the file you want to send)
21. $ Mail FILENAME rlkennedy@ualr.edu (To send the file to my account)
22. $ LO
23. LH111A> LO (yes, again)
24. Local -020- Logged out port 26 [NO return here]
25. Close all windows by clicking in little boxes

You may need to check the SETTINGS to allow transfer of an ASCII file. If so, after step 11:

1. Click on SETTINGS at the top of the screen.
2. Pull down with the mouse to File Transfer.
3. Select Text as the Method.
4. Click on the box that says Strict ASCII.
5. Click on OK.

Printing Mail or Files (Larson or Library Labs)
Saving a File to Disk

1. Mail> Read
2. Mail> Extract (at any Mail> prompt which appears while you are reading mail)
3. _File: [Filename]
4. % Mail-I-Created Disk$ User: [rlkennedy]Filename.Txt;' created
5. Mail> Exit

These steps will save a file to a disk:

6. $ Dir [Note that filename is available]
7. Click on File-Transfer at top of screen, hold, and pull down to Set Directory.
8. Insert disk.
9. Click on Drive until see diskette icon.
10. Click on Set.
11. $ Kermit
12. C-Kermit> Send filename.
13. Return to your local Kermit and give a RECEIVE command.
    KERMIT READY TO SEND. . .
14. Click on File-Transfer at top of screen, hold, and pull down to Receive File.
15. There will NOT be 2 beeps when the file transfer is completed.
16. C-Kermit> Exit
17. $ LO
18. LH111A> LO
19. Local -020- Logged out port 31
20. Close window by clicking once in box in upper left corner
21. Click on File, hold, and pull down to quit.
22. Close station window.
23. Click on Special, hold, and pull down to Shut Down.
24. Disk will eject.